

DESCRIPTION OF *PERIPATUS OVIPARUS*.

BY ARTHUR DENDY, D.SC., PROFESSOR OF BIOLOGY IN THE  
CANTERBURY COLLEGE, UNIVERSITY OF NEW ZEALAND.

In my presidential address to the Biological Section of the Australasian Association for the Advancement of Science, at the meeting recently held in Brisbane, I pointed out certain facts which had lately come to light with regard to the literature of the Australian species of *Peripatus*, and which might render necessary certain alterations in the nomenclature. At the same time I still refrained from attaching a specific name to the oviparous Victorian species, pending further evidence. After my address was written I had the opportunity of talking over the matter with Mr. J. J. Fletcher in Sydney, and found that he had independently arrived at conclusions very similar to those contained in my manuscript. Mr. Fletcher suggested that we should each contribute a paper on the subject to the next meeting of this Society, and that in my contribution I should confine myself to the egg-laying Victorian species, which we agreed should now receive a name. In accordance with this suggestion I now submit a description of the species in question, for which I propose the name *Peripatus oviparus*.

Very fortunately, while I was in New South Wales, my friend Mr. Thos. Steel, F.C.S., was successful in finding a large number of the viviparous species with fifteen pairs of claw-bearing legs. These I was able to examine both alive and by means of dissection, and I have thus satisfied myself that the oviparous Victorian form is certainly worthy of a distinctive name.

## PERIPATUS OVIPARUS, n.sp.

*Peripatus leuckartii* (probably in all cases where this name has hitherto been applied to specimens from Victoria with fifteen pairs of claw-bearing legs, especially in earlier papers of the present writer, but not where the name has been applied to specimens from New South Wales).

A good-sized female specimen, when crawling, measured 39 mm. in length, exclusive of the antennæ. Full-grown females preserved in spirit and contracted in the usual manner (not extended by drowning) measure about 20 mm. in length (exclusive of the antennæ) by 4.5 mm. in greatest breadth (exclusive of the legs). The males seem to be commonly somewhat smaller than the adult females, but the evidence at present forthcoming is not sufficient to justify a generalization on this point.

There are fifteen pairs of claw-bearing legs. Each leg has three pale-coloured spinous pads on its ventral surface. On the fourth and fifth legs the proximal and largest pad is divided transversely into three parts, the median part being much the smallest and bearing a white papilla. Each foot bears three large primary papillæ, one anterior, one posterior, and one dorsal, overhanging the pair of claws.

The jaws consist as usual each of two blades, the inner blade has about seven teeth and the outer one consists of a single well-developed tooth with a very small accessory tooth at its base.

The integument is as usual transversely furrowed, with rows of papillæ of varying size on the intervening ridges. Along the mid-dorsal line there is a deep narrow groove; the integument lining the floor of this groove is devoid of pigment and thus gives rise to a very narrow median white line, which may be hidden by contraction.

The predominant colours of the skin are red and indigo blue, the former passing into yellow and the latter into black in some specimens. The characteristic pattern of the dorsal surface consists chiefly in a series of segmentally arranged, diamond-shaped patches in which the red colour is predominant. Each

patch is made up of two triangular halves whose bases face one another on each side of the mid-dorsal line, while their apices lie over the legs and at about one-third of the distance from the mid-dorsal line to the insertion of the legs. The separation of the diamonds from one another is by no means complete, so that there are two continuous bands of red, one on each side of the mid-dorsal line, the outer margins of which bands are deeply indented. The edges of the mid-dorsal groove are commonly darkly pigmented, and may give rise to an apparently single median dark line when the lips of the groove are closed together. There is commonly also a dark edging to the red diamonds, forming a zig-zag longitudinal stripe. This typical pattern may be almost if not quite obliterated by the replacement of the red pigment by the dark indigo blue; but even in very dark specimens it may still be represented by a row of small, pale yellow or red spots, each occupying the position of the apex of one of the red triangles in typical specimens. The ventral surface is paler than the dorsal, and there is in the middle line a row of still paler areas placed one between the legs of each pair but the last. Patches of dark indigo blue are usually present on the under surfaces of the legs near to their bases.

In the adult female, in place of the usual genital papilla, there is a very conspicuous organ which may be called an ovipositor. This, when contracted, is an ovoid body of a pale yellow or orange colour, projecting backwards from between the legs of the last (15th) pair. In adult specimens ordinarily contracted in spirit the ovipositor is as large or larger than the legs between which it lies. It is, however, capable of great extension. Its surface is uniformly ornamented with minute, spine-bearing papillæ, and at its apex it bears a large slit placed parallel to the long axis of the body of the animal.

The internal reproductive organs of the female are arranged as follows:—The ovary consists of right and left halves united in front and behind and attached by a mesentery to the pericardial septum in the mid-dorsal line. The oviducts are long and convoluted; they have a common origin from the posterior end of the

ovary, to which they are attached. Near to its point of origin each bears an oval receptaculum seminis with two ducts. It is very important to observe that each oviduct is divided into three parts. All three parts are narrow except where swollen by the contained eggs. The first is very short and extends from the point of attachment to the ovary to about the level of the receptaculum; its wall is greatly folded and provided with little excrescences on the side opposite to the receptaculum. The middle and last portions of the oviduct are of about equal length. The middle portion is very thick-walled and apparently glandular. The last portion has very thin, transparent, membranous walls. At their hinder ends the oviducts unite in a thick-walled triangular sac, whose posterior angle is continued into the ovipositor.

I have found eggs in both the middle and last portions of the oviduct, but much more abundantly in the last. Their number varies greatly. In one specimen, for example, there were three eggs in each oviduct; in a second there were seven in one and six in the other; in a third there were eight in one and nine in the other.

The eggs at the time of laying show no appearance of embryos within them, but each consists of a quantity of milky fluid, containing numerous yolk granules, enclosed in a very thick, tough, but rather soft envelope of a pale yellow colour and beautifully sculptured on the outside. The sculpturing consists of little crumpled papillæ, somewhat resembling worm-casts, arranged at fairly regular intervals over the surface, and with much finer meandering ridges occupying the spaces between them. The eggs are oval in shape and measure about 1.9 by 1.5 mm.

A careful re-investigation of my material has led me to the following conclusions with regard to the egg-envelope. The envelope really consists of three membranes. (1) A very thin transparent membrane immediately surrounding the yolk and probably to be regarded as a vitelline membrane. (2) A very thick membrane which is apparently formed as a secretion in the thick-walled part of the oviduct. In sections of a female containing eggs in the oviduct this membrane is very clearly shown, and

is seen to have a thickness of about 0.036 mm. It is of a pale yellow colour when fresh, and has a very finely granular appearance. In a former paper I erroneously stated that this membrane or shell is smooth, or nearly so, while still *in utero*. It is true that the complete sculpture is not formed till the time of laying, but my recent observations have shown conclusively that the foundations of that sculpture are already present when the eggs are lying in the thin-walled part of the oviduct. These foundations consist of a number of little rounded protuberances regularly distributed over the surface of the thick membrane. They are not very obvious in fresh specimens and require careful looking for, but in specimens which have lain for a long time in alcohol previous to dissection the thick egg-membrane assumes a rather dark brown colour, and the protuberances may become conspicuous in surface view as much darker, well-defined circular areas about 0.04 mm. in diameter. In addition to these protuberances the thick membrane frequently, perhaps always, exhibits longitudinal striations of an ill-defined character. (3) The fortunate discovery of an egg partially extruded from the greatly distended ovipositor in a specimen preserved in alcohol indicates the formation of a thin, transparent membrane outside the thick one just described. This membrane appears to be formed as a secretion, probably by the walls of the triangular sac at the base of the ovipositor. The abnormal conditions in the case under notice have prevented its even deposition, and the amber-coloured, chitinous (?) material is mostly collected in a large plug attached to what was the inner end of the egg. I have little doubt that the wrinkling of this chitinous (?) membrane as it dries upon the already embossed under-lying membrane gives rise to the complete sculpture of the perfect egg-shell, for the smooth papillæ of the thick middle membrane exactly correspond in arrangement with the crumpled papillæ of the perfect shell.

The development of the embryo within the egg-shell appears to be a very lengthy business, for, as I have stated in a previous paper, one of the eggs laid in my vivarium in Melbourne hatched out after an interval of a year and five months from the time of

DESCRIPTION OF *PERIPATUS OVIPARUS*.

laying. The time of development may, however, have been prolonged by the exposure to artificial conditions. The eggs were laid between the middle of May and the end of July.

In the male the genital papilla is situated in the same position as in the female, but is much less prominent. On either side of it, in the angle between the leg and body, is a white papilla bearing the aperture of an accessory gland. Behind it and just in front of the anus are a pair of apertures belonging to other accessory glands. Crural glands occur in all the legs from the second to the thirteenth, and possibly also in the fourteenth. The aperture of the crural gland is situated on the under-surface of the leg, and the nephridial aperture lies inside it, except in the fourth and fifth legs. The white papilla which bears the aperture of the crural gland may be either prominent or sunk in a depression, according to the state of contraction, and hence the number of these white papillae on the under-surfaces of the legs may appear to vary in different specimens. I have been unable to find any crural glands in the female.

I have a number of males in my possession, and I assume that they belong to the same species because they were found in the same localities as the oviparous females, while no viviparous females with fifteen pairs of legs have yet been found in Victoria. The males exhibit the same range in pattern and colouration as the females.

It is unnecessary in this place to describe the general internal anatomy of *Peripatus oviparus*; suffice it to say that it conforms closely to the usual condition as described in other species.